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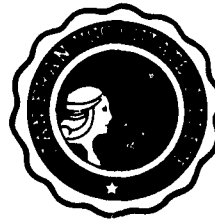
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THE EFFECT OF CHANGING SIZE  
UPON ORGANIZATIONS

Frederic W. Terrien

A partial test of a theory of organization  
First annual report March, 1963

Prepared in connection with research done under  
Contract Nonr 3646(00) NR 177-253  
Group Psychology Branch  
Office of Naval Research



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# ABSTRACT

This study is a continuation, under the auspices of the Office of Naval Research, of a project undertaken some time ago, whereof the objective was to test the hypothesis that the administrative component of an organization increases in size at a proportionately greater rate than does the containing organization. Work is completed or planned in four fields: education, business, municipal government and the military. To date, the hypothesis has been substantiated in a large sample of California's school districts. The first test in business, in a major banking system, did not support the hypothesis. A second test in business, utilizing a number of general hospitals of various sizes, is presently underway; with one fourth of the sample reviewed, it so far yields a random distribution of administrative component sizes which do not relate to organization size.

## ACKNOWLEDGEMENTS

Although this report covers only the first year of a projected three-year study, a very considerable debt of gratitude has already been incurred. Since the study has involved an exhaustive review of the personnel records of a number of organizations, it would have been impossible to begin work without the cooperation of the managers of these organizations.

The investigator owes much to Mr. Jess E. Wilson, Vice President and Personnel Officer, and to Mr. Robert E. Massotti, Assistant Vice President -- Personnel, of the Crocker-Anglo National Bank in San Francisco. These gentlemen not only provided all the information desired by the investigator but also assigned staff to work with him during his many days in their offices.

The start of the study of hospitals was made possible by the kindness of Mr. Harold H. Hixson, Administrator of the University of California Hospitals, and President of the Hospital Council of Northern California. Mr. Hixson sought and secured the approval of the Board of Directors of the Council for the study, and thereafter, wrote each of the administrators so far seen, requesting his cooperation.

Finally, the investigator is beholden to the administrators of the seven hospitals visited, who were kind enough to absent themselves from their regular duties for the greater part of a day in order to assist the investigator. When this part of the study is complete, these administrators will be named.

All of the data gathered here represent the best effort of the investigator to be accurate, but no organization should be held responsible for any errors. All judgments and comments in the report are the work of the investigator, and solely his responsibility.

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Six tables accompany the text.

Personnel Involved in the Project

Director:           Frederic W. Terrien, Ph.D.  
  
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Consultant:         Donald L. Mills, Ph.D.  
  
                    Associate Professor of Sociology  
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## Objective and Hypothesis

The objective of the research project described herein is to test the theory that the size of a social group affects the ordering and the quality of that group's relationships.

The plan calls for a test of the theory in four fields: education, business, municipal government and the military. An application of the theory in the first field, education, was undertaken some time ago, and the theory found to be substantiated there. That work has been described in an article<sup>1</sup>, and an analysis of the implications of the theory has been made in another<sup>2</sup>. This, the first annual report of research done under Contract Nonr 3646(00), Office of Naval Research, covers the initial phases of the planned check in the field of business.

The hypothesis by which these tests are being made states that:

The administrative component of an organization increases in size at a proportionately greater rate than does the containing organization in a situation of increase in total size.

### First Test of the Hypothesis

The first checks on the applicability of the theory to business were made with a stratified selected sample of the units of the Crocker-Anglo National Bank. On 31 January 1962, the base date for this segment of the study, the bank had 116 units and resources of just over \$2 billion. It is organized on a decentralized basis, with an Administrative Headquarters in San Francisco and 115 branches throughout the northern two-thirds of the State of California.

The Personnel Department, in the Administrative Headquarters, maintains complete records of all units in the system. It was possible, therefore, to select a sample of units at various size levels, to review the job titles and organization plans of these units, and to determine, with the assistance of the department, the proportion of administrators in each.

The results are shown in three tables. Table I reports on the number and percentage of administrators -- defining an administrator, for the moment, as "a person having responsibility for an direction of five or more other persons." Table II places the units of the bank in three size groups and shows no significant differences in the proportion of administrators by these groups, and Table III summarizes the proportion of administrators when the definition of "administrator" is taken to be a person directing the efforts of, first, five others; then four, three, two and one.

This test with the Crocker-Anglo Bank does not substantiate the hypothesis. Indeed, the results show clearly that as the units of the bank grow larger, the proportionate size of their administrative components declines.

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1. Terrien, F.W. and Donald L. Mills, "The Effect of Changing Size upon the Internal Structure of Organizations," American Sociological Review, 20 (February, 1955).
  2. Terrien, F.W., "Too Much Room at the Top?" Social Forces, 37 (May, 1959).

TABLE I

Data on Selected Units of Various Sizes of the Crocker-Anglo National Bank, Showing Number and Percentage of Administrators\* and Number and Percentage of Administrative Titles\*\*

Number of Persons in Unit	Number of Units Having Given Number of Persons	Average or Specific Number of Administrators	Percentage of Administrators	Number of Administrative Titles	Percentage of Administrative Titles
7	6	1	14.29	2	28.57
14	8	3	21.43	3.1	22.14
20	3	2.66	13.30	4	20.00
26	5	4	15.38	5.4	20.77
34	2	5	14.71	6	17.65
45	1	8	17.78	8	17.78
46	1	7	15.22	12	26.09
64	1	8	12.50	12	18.75
66	1	8	12.12	12	18.18
73	1	9	12.33	14	19.18
88	1	9	10.23	17	19.32
189	1	24	12.70	36	19.05
286	1	34	11.89	45	15.73
Administrative Hdq. 1101	1	129	11.72	253	22.98

\* an Administrator is defined as a person having responsibility for and direction of five or more other persons

\*\* an Administrative Title is designated in the Crocker-Anglo system as one ranging from Head Bookkeeper (responsibility for five or more persons) to Chairman of the Board

In the 32 branches included in the sample, the mean percentage of Administrators was 15.88. The mean percentage of Administrative Titles was 21.93.

TABLE II

Administrative Components of Selected Units of the Crocker-Anglo National Bank,  
Expressed as a Percentage of the Total Number of Employees in Each Unit, by  
Size of Unit

Size of Unit	Number of Units of Given Size	Range of Number of Employees	Total Employees in Units Considered	Total Administrators in Units Considered	Percentage of Adminis- trators	Standard Deviation
Small	26	7-46	503	83	16.5	1.66
Medium	4	64-88	291	34	11.7	1.88
Large	2	189-286	475	58	12.2	1.50

TABLE III

Data on Selected Units of Various Sizes of the Crocker-Anglo National Bank, Showing Number and Percentage of Administrators, When "Administrator" is Defined as "A Person Having Responsibility for and Direction of" the Number of Persons Noted:

Identifying Number of Branch Bank	Number of Positions in Bank		Five or more persons directed	Four or more persons directed	Three or more persons directed	Two or more persons directed	One or more persons directed
119;120;122 124;125;126	7 (in each)	Administrators:	1	2	2	2	2
		Percentage:	14.29	28.57	28.57	28.57	28.57
54;68;76;88 104;108;116 117	14 (in each)	Administrators: (average)	3	3	3	3.25	3.25
		Percentage:	21.43	21.43	21.43	23.21	23.21
14;61;77	20 (in each)	Administrators: (average)	2.66	3.33	5	5.33	6
		Percentage:	13.30	16.66	25.00	26.65	30.00
11;33;43 53;115	26 (in each)	Administrators: (average)	4	4.60	4.80	5.20	5.60
		Percentage:	15.38	17.69	18.46	20.00	21.54
16;51	34 (in each)	Administrators: (average)	5	5.50	6.00	6.00	6.50
		Percentage:	14.71	16.18	17.65	17.65	19.12
22	45	Administrators:	8	8	8	8	9
		Percentage:	17.78	17.78	17.78	17.78	20.00
58	46	Administrators:	7	9	9	10	12
		Percentage:	15.22	19.57	19.57	21.74	26.09
29	64	Administrators:	8	8	8	8	9
		Percentage:	12.50	12.50	12.50	12.50	14.06
59	66	Administrators:	8	8	9	10	11
		Percentage:	12.12	12.12	13.64	15.15	16.67

31	73	Administrators:	9	9	9	9	9
		Percentage:	12.33	12.33	12.33	12.33	12.33
25	88	Administrators:	9	10	11	12	12
		Percentage:	10.23	11.36	12.50	13.64	13.64
10	189	Administrators:	24	26	26	27	30
		Percentage:	12.70	13.76	13.76	14.29	15.87
#1 Montgomery	286	Administrators:	34	36	38	38	43
		Percentage:	11.89	12.59	13.29	13.29	15.03
Administ. Headquarters	1101	Administrators:	129	136	144	149	164
		Percentage:	11.72	12.35	13.08	13.53	14.90
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(Total person- nel in banks reviewed)	2370	Administrators:	305	330	349	363	396
		Percentage: (means)	12.87	13.92	14.73	15.32	16.71

### Analysis of the First Test

The reasons for this decline, and the consequent invalidation of the hypothesis in this test, are several:

First, the Crocker-Anglo National Bank has an unusually large Administrative Headquarters -- probably a consequence of the nature of its business. Of the 5011 persons employed in the system, on the base date, no less than 1101, or nearly 22 per cent, were in the central headquarters.

This massive unit apparently retains within itself a number of the functions which a decentralized organization with a more conventional structure would ordinarily assign to the field units. The Personnel Department in the headquarters, for example, does a large share of the hiring for the whole system -- handling almost all such work for levels above that of clerk.

Second, the nature of the bank's work permits a high degree of job standardization<sup>3</sup> -- or more exactly, demands it, since one of the keys to the bank's survival is predictably complete accuracy. Other jobs are so highly specialized as to require several words in their job-titles: "Supervisor of Letter-of-Credit Advisory Section," or "Trust Income and Real Estate Review Clerk." It is very likely true that once these jobs, both those standardized and those specialized, are learned, the amount of supervision they require is small.

Because of this factor, the bank has adopted the plan of appointing one person in most branches to direct the efforts of nearly all "worker" personnel -- a person who is quite uniformly designated as the "Operating Supervisor." His span of control is wide. In one bank of 34 persons, for example, 21 report directly to the Operating Supervisor.

Third, and related to the above, is a fact revealed in the fifth and sixth columns of Table I. These show that the proportion of administrative titles is greater than that of administrative positions, by a ratio of about three to two. An administrative title is designated in the Crocker-Anglo system as one ranging from Head Bookkeeper to Chairman of the Board. An administrative position, for the purposes of Table I, is one wherein the person holding it is responsible for five or more subordinates.

This phenomenon, again, is a function of the nature of banking, which sets up a number of responsible positions whereof the holder must be a well-trained specialist -- in many cases, a seasoned expert in some field of banking. His function is essentially that of decision-making and negotiation with persons outside the system. He works hard, but his supervisory responsibilities, as often as not, do not extend beyond his secretary.

An extreme example of this arrangement is found in the International Banking section of Administrative Headquarters. Its roster shows a total of 84 members, of which two are Vice Presidents; five, Assistant Vice Presidents; five, Assistant Cashiers, and five, Supervisors. Though there are 17 administrative titles, only eight persons direct the work of five or more subordinates.

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3. Dubin, Robert, The World of Work. Englewood Cliffs, N.J.: Prentice Hall, Inc. 1958.

Thus, 20 per cent of the unit performs work of an administrative nature, but less than 10 per cent performs any extensive supervisory functions.

Table III clearly illustrates the process of placing a large number of persons under the authority of the Operating Supervisor. If the reader's attention is directed to a bank at a given size level -- say, Branch Number 22, of 45 persons -- and he looks across the line labelled "Administrators" at the figures given under the columns labelled "Five or more persons directed" and so on across to "One or more persons directed," he will see that there is very little change in the number in the various columns. For this particular bank, even reducing the number of persons directed to one will account for the gain of only one administrator.

In Bank Number 31, with 73 persons, there is no change at all across the board. It is only in the two largest units, Number One Montgomery, and Administrative Headquarters, that the number of administrators changes much with a reduction in the number of persons directed. This means, of course, that the relatively few persons who have supervisory responsibilities have fairly large ones -- an additional reason why the hypothesis does not apply in the case of the Corcker-Anglo National Bank.

## Second Test of the Hypothesis

The second checks on the applicability of the theory to business were begun on a stratified, random sample of acute general hospitals in the San Francisco Bay Area. The material which follows covers the first seven hospitals of a projected sample of 28 hospitals.

By way of definition, acute general hospitals are facilities "staffed and equipped to provide various types of intensified hospital care including but not limited to short-term care in acute, medical, surgical and obstetrical services."<sup>4</sup> They are clearly different from nursing homes, maternity homes, and convalescent hospitals.

The results of this initial test are shown in Tables IV and V. The first of these shows the proportion of administrators in the seven hospitals so far reviewed, when "administrator" is defined as a person directing the efforts of five, four, three, two, and one subordinates.

For purposes of sharper analysis, the Nursing Service segment -- always the largest single part of any hospital -- was extracted in each case from the overall figures on each hospital and the proportion of administrators determined in the same manner. These results appear in Table V.

This as-yet-incomplete test on hospitals does not substantiate the hypothesis. The percentages of administrators are so randomized among the various size levels that no pattern whatever emerges.

## Comments on the Second Test

The sampling process has not yet gone far enough in hospitals to determine the degree to which organization in the Nursing Service segments is crucial to the proportion of administrators in the whole organization. It should be noted, parenthetically, that in determining the size of a hospital staff, persons and positions can be counted interchangeably in all departments except Nursing Service. In this major segment, however, the necessity for keeping all shifts covered makes it mandatory to count positions. Thus, it may take four persons to cover one "Staff RN" position during three shifts and over week-ends, but this manner of counting makes no difference in the ratio of administrators to total staff.

When Nursing Service units are examined, some interesting changes may be noted among the seven hospitals reviewed to date. Hospital F, which overall is second in number of total staff, drops to fifth place when the hospitals are ranked according to size of Nursing Service. Nurses in this hospital constitute only 19.45 per cent of the total personnel, whereas in four others in the group they constitute between 51 and 59 per cent of the total.

Furthermore, it will be noted that the percentage of administrators in this relatively small segment of Hospital F is more than twice the average when the

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4. Hospital Licensing Act and Requirements, Berkeley: Department of Public Health, State of California, January, 1962.



TABLE IV

Data on the First Seven of a Stratified, Random Sample of Acute General Hospitals in the San Francisco Bay Area, Showing Number and Percentage of Administrators, When "Administrator" is Defined as "A Person Having Responsibility for and Direction of" the Number of Persons Noted:

Name of Hospital	Number of Positions on Staff		Five or more persons directed	Four or more persons directed	Three or more persons directed	Two or more persons directed	One or more persons directed
Hospital A	51	Administrators:	2	6	9	9	15
		Percentage:	3.92	11.76	17.65	17.65	29.41
Hospital B	68	Administrators:	10	10	10	10	11
		Percentage:	14.71	14.71	14.71	14.71	16.18
Hospital C	144	Administrators:	17	19	20	23	29
		Percentage:	11.81	13.19	13.89	15.97	20.14
Hospital D	191	Administrators:	17	23	29	34	38
		Percentage:	8.90	12.04	15.18	17.80	19.90
Hospital E	277	Administrators:	33	37	42	49	59
		Percentage:	11.91	13.36	15.16	17.69	21.30
Hospital F	329	Administrators:	48	54	64	88	96
		Percentage:	14.59	16.51	19.45	26.75	29.18
Hospital G	382	Administrators:	28	30	37	52	66
		Percentage:	7.83	7.85	9.69	13.61	17.28
(Total personnel in hospitals reviewed)	1442	Administrators:	155	179	211	265	314
		Percentage: (means)	10.75	12.41	14.63	18.38	21.78

Data on the First Seven of a Stratified, Random Sample of Acute General Hospitals in the San Francisco Bay Area, Showing Number and Percentage of Administrators in NURSING SERVICE, When "Administrator" is Defined as "A Person Having Responsibility for and Direction of" the Number of Persons Noted.

Name of Hospital	Number of positions in NURSING SERVICE	Ratio of NURSING SERVICE personnel to total staff		Five or more persons directed	Four or more persons directed	Three or more persons directed	Two or more persons directed	One or more persons directed
Hospital A	26	51.00%	Administrators:	1	3	5	6	8
Total Staff	51		Percentage:	3.85	11.54	19.23	23.08	30.77
Hospital B	40	58.82%	Administrators:	5	5	5	5	5
Total Staff	68		Percentage:	12.50	12.50	12.50	12.50	12.50
Hospital F	64	19.45%	Administrators:	17	21	27	47	55
Total Staff	329		Percentage:	26.56	32.81	42.19	73.44	85.94
Hospital C	74	51.39%	Administrators:	9	11	12	14	19
Total Staff	144		Percentage:	12.16	14.86	16.22	18.92	25.68
Hospital D	84	43.98%	Administrators:	9	12	16	18	21
Total Staff	191		Percentage:	10.71	14.29	19.05	21.43	25.00
Hospital E	146	52.71%	Administrators:	17	19	23	30	39
Total Staff	277		Percentage:	11.64	13.01	15.75	20.55	26.71
Hospital G	152	39.79%	Administrators:	11	13	19	32	42
Total Staff	382		Percentage:	7.24	8.55	12.50	21.05	27.63
<hr/>								
Total NURSING SERVICE PERSONNEL	586	40.63% (mean)	Administrators:	69	84	107	152	189
Total Staff	1442		Percentage: (means)	11.77	14.33	18.26	25.94	32.25
		(Median = 51.00%)						

administered group is designated as five subordinates, and rises to two and one-half times the average when the administered group is one subordinate. So small a proportion of staff members in nursing warrants further investigation, as does the unusually high proportion of persons designated as administrators in this group. Both inquiries are under way.

It is clear that "team nursing" is widely practiced in the hospitals investigated -- indeed, it is an adjustment to changing conditions within hospitals that is becoming accepted across the country. Team nursing serves to distribute the knowledgable efforts of the registered nurse more widely than would be possible if she were working alone -- for her "team" generally consists of a licensed vocational nurse, an aide, and an orderly, hospital attendant or some other less qualified person who can, at her direction, carry out the more routine tasks. The registered nurse thus devotes herself more to record keeping, and to organizing the efforts of her subordinates than to performing the more traditional services for the patient. She becomes, in effect, a kind of administrative link between doctor and the patient. Current journals in the hospital and nursing fields are filled with articles which assess the changing role of the nurse. With this change in role, of course, come changes in the administrative organization of both Nursing Service and the hospital as a whole.

If the preliminary data so far gathered do not substantiate the hypothesis, they do invoke speculation about a related assertion -- namely, that there may be a certain stability about the proportion of administrators in various kinds of groups.

The figures in Table VI illustrate this point:

Table VI

Mean Percentage of Administrators for Hospitals, Nursing Services,  
and Units of the Crocker-Anglo National Bank

Kind of Group	Five or more persons directed	Four or more persons directed
Hospitals	10.75	12.41
Nursing Services	11.77	14.33
Units of the Crocker- Anglo National Bank	12.87	13.92

### Plans for Future Tests of the Hypothesis

The next step in the research is to extend investigation into the remaining 21 hospitals in the sample of 28. Their sizes, in the larger cases, amount to more than three times the largest hospital so far visited.

In the second year, plans call for the testing of the hypothesis on California municipalities. The cooperation of the League of California Cities has been secured. This test will take note of the relationship between the number of administrators and the total number of persons in the city governments of various sizes, and also will note the relationship between the size of the city governments and the total populations of the containing cities. City-manager governments, which make up nearly all of those in California, will constitute the universe.